Eaton-Williams Ltd

QUALITAIR

INSTALLATION MANUAL

ICC COOLING STORAGE UNIT
ICC/ICU SYSTEM

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ICC / ICU SYSTEM INSTALLATION MANUAL

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1. INSTALLATION & SAFETY

1.1 Installation

The units making up the Air Conditioning System must only be installed by a qualified engineer, following the mandatory and local codes of practice.

1.2 Handling

Care must be taken when the units are moved or lifted to ensure that everyone and everything is safe. When lifting equipment is used, it must be suitable and approved.

1.3 Application

Ensure that the unit is only used for suitable purpose/application.

1.4 Electrical Connection

Electrical work and connections must only be made by authorised electricians, in accordance with mandatory regulations and local codes of practice.

1.5 Warranty

Failure to comply with the manufacturer's installation instructions could affect the performance of the unit and invalidate the warranty. Warranty is also subject to the implementation of a planned service/maintenance agreement as documented in the warranty booklet supplied with the unit.

1.6 Safety Procedures

General

1. All works must be carried out in accordance with the manufacturer's installation and operating procedures.
2. Good working practices must be followed at all times so that Mechanical and Electrical hazards are kept to a minimum.
3. The equipment has been fitted with doors and covers to prevent access during operation. These must be kept in place and additional guards fitted, if necessary.
4. The equipment must be connected to an external electrical isolator if one is not supplied fitted to the unit.
5. Servicing and maintenance must only be carried out by fully qualified and competent staff. Before any work is started, electrically isolate the units to make sure that they cannot be switched on accidentally and allow sufficient time for isolated parts to come to rest before removing panels. Electrical isolation switches must be labelled to show that they are OFF during servicing and maintenance operations.

Note: Some units are dormant in standby mode and can restart without warning if they are not electrically isolated.

6. Care must be taken not to touch components or pipework which may be extremely hot or cold, for a period after the unit is electrically isolated.
7. After completing any tasks ensure all guards, covers and doors are correctly refitted before restoring the power supply to the unit.
8. Air conditioning equipment may generate unacceptable noise levels. If noise levels are unacceptable sound and vibration attenuators may be required. For noise level guidance refer to technical literature, or contact Qualitair, or their distributors for advice.

SPECIAL NOTE

IF ANYTHING IS NOT CLEAR, PLEASE CONTACT YOUR DISTRIBUTOR FOR CLARIFICATION.

2. INTRODUCTION TO UNITS

2.1 ICC Indoor Unit

The ICC has been designed for installation in areas which require products or produce to be stored in cool conditions (down to 5°C). As standard, the units are suitable for DX cooling only, but the option of an electric heater is available.

2.2 ICU Outdoor Unit

The unit is a floor-standing condensing unit which can also be wall mounted using the ICU Wall Bracket Option Kit. The unit is supplied complete with axial fan and guard, hermetic compressor, shut-off service valves, fan speed controller, low pressure switch, high pressure switch, start delay timer, winter start and an electrical section.

2.3 Option Kits

The ICC and ICU units can be supplied with option kits which will require fitting at site. Instructions for fitting are supplied with the Option Kits.

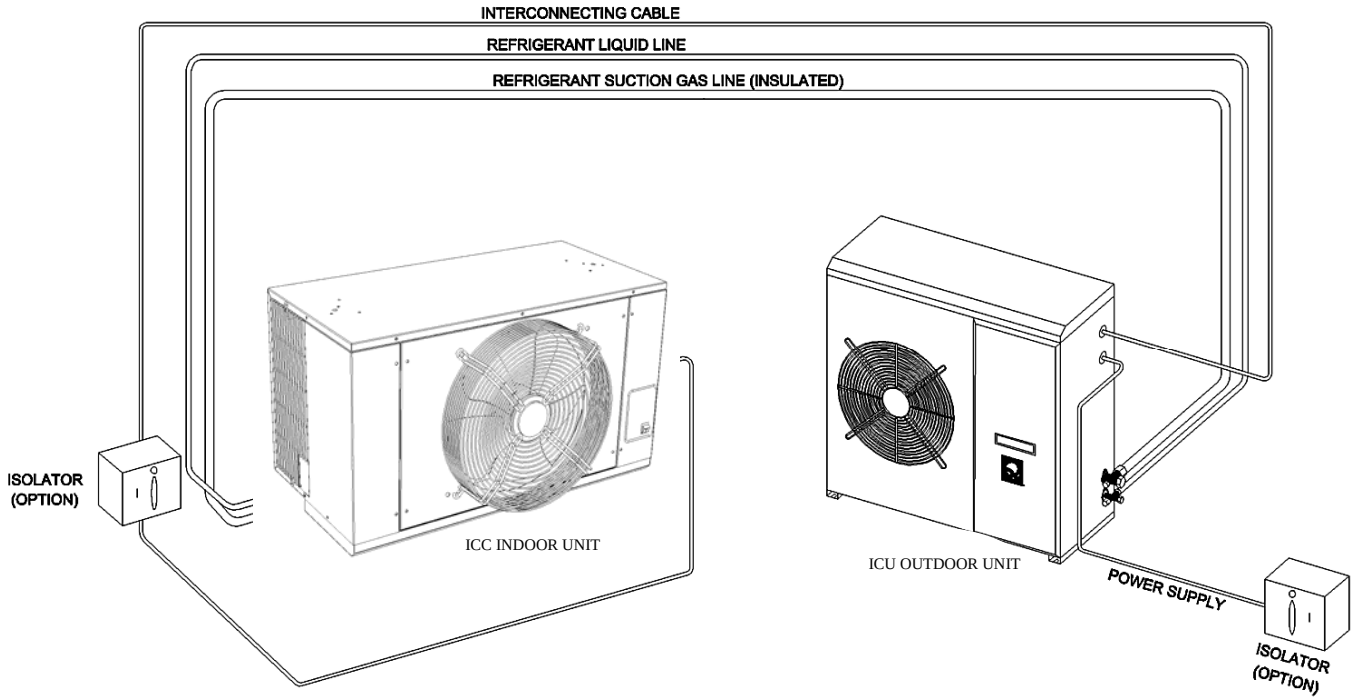
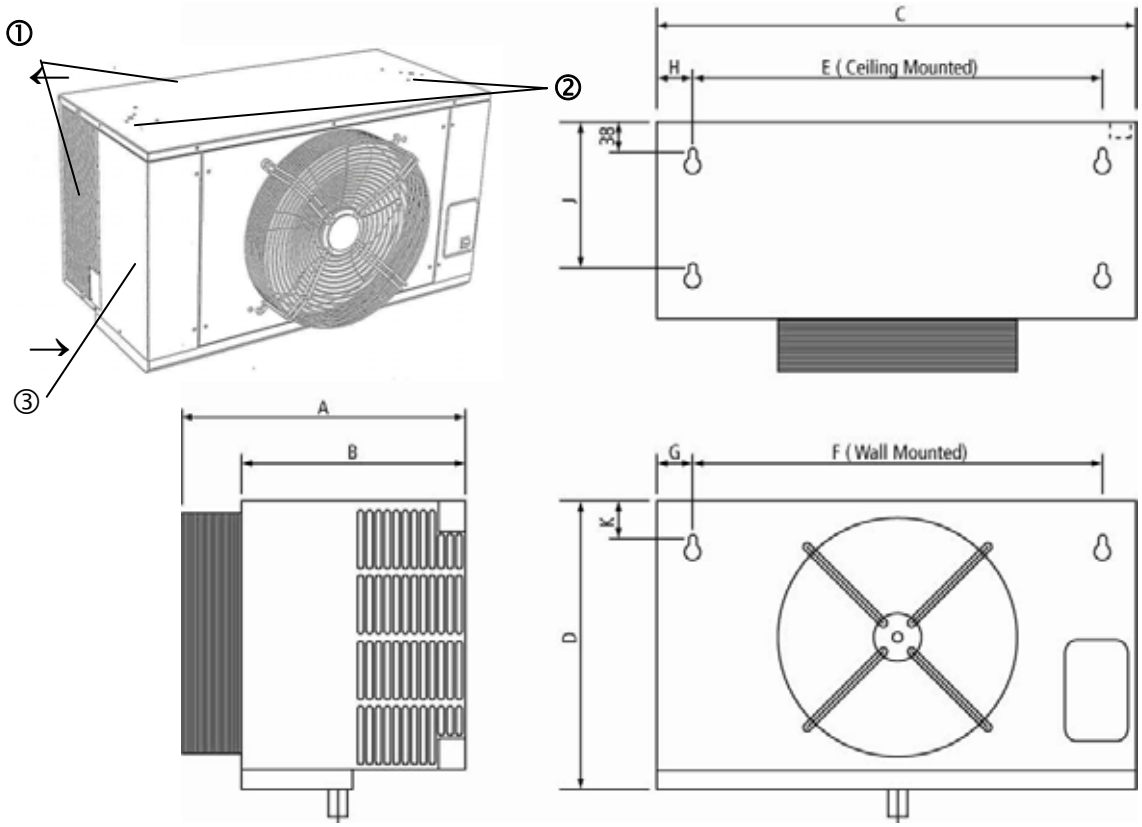


FIGURE 2.1

SPECIAL NOTES:
CHECK THAT THE INDOOR UNIT IS CORRECTLY MATCHED TO THE OUTDOOR UNIT.
(SEE APPLICATION GUIDE)
ALL PIPE WORK, INSULATION AND ELECTRICAL CABLING IS TO BE SUPPLIED BY OTHERS.

3. LOCATION & MOUNTING OF INDOOR UNIT (ICC)



	ICC 25	ICC 35	ICC 50	ICC 60	ICC 70
A	475	475	475	525	525
B	390	390	390	440	440
C	805	805	805	865	865
D	450	450	450	525	525
E	680	680	680	740	740
F	680	680	680	680	680
G	62	62	62	92	92
H	62	62	62	32	32
J	300	300	300	350	350
K	50	50	50	50	50

Figure 3.2 – ICC Positioning

3.1 Location

The ICC unit should be mounted level on a load bearing wall or ceiling. The minimum distance from the floor should be 1.8 metres to ensure good air convection. The side inlet grilles should have a minimum clearance from obstruction of 100mm and the minimum clearance in front of the unit should be 1.5 metres.

3.2 Fixing

The unit should be fixed to the wall using two-off rear fixings (1) or to the ceiling using the two-off top fixings (2). 10mm diameter rawbolt type fixings (supplied by others) with large steel washers are recommended for fixing to a local load bearing wall or ceiling. Locking screw holes to be used to prevent equipment moving once installed.

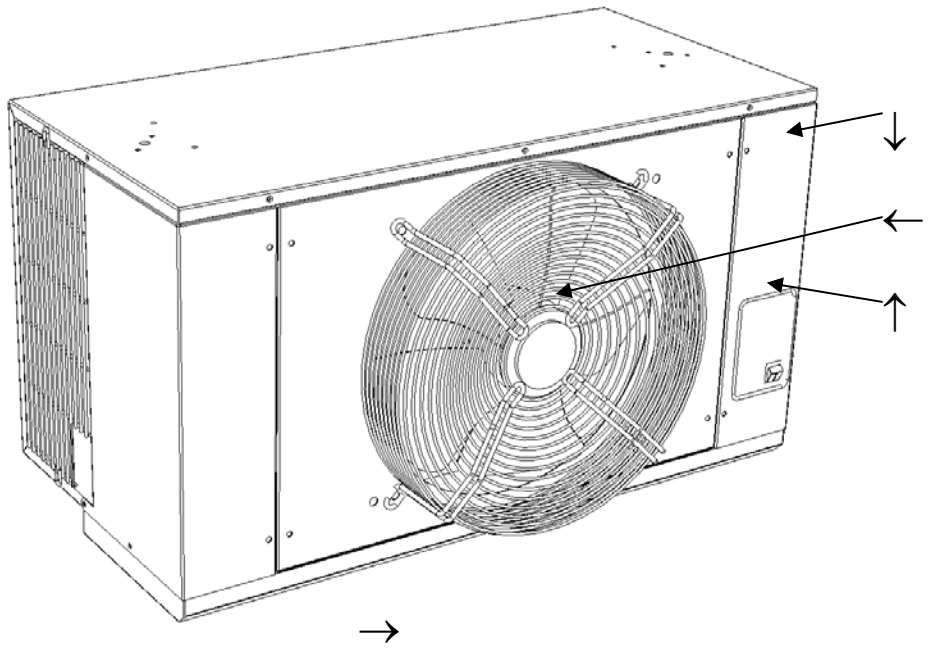
3.3 Service Connections

The refrigerant pipe connections are accessed through the left hand side panel (3). Cable entry is on the right hand side of the unit. A plastic drain connector is supplied (inside the control box) to be site fitted onto the condensate tray.

SPECIAL NOTE

ENSURE THE INDOOR UNIT IS INSTALLED LEVEL TO PREVENT DRAINAGE PROBLEMS.

4. INDOOR UNIT ACCESS (ICC)



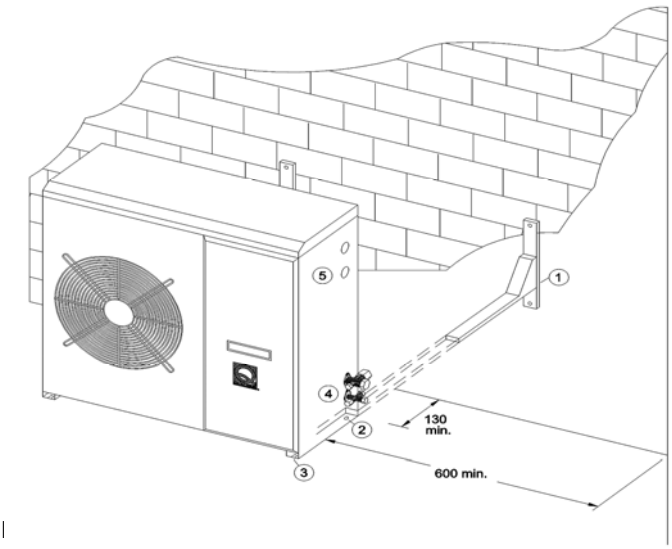
4.1 Access Details/Fixings

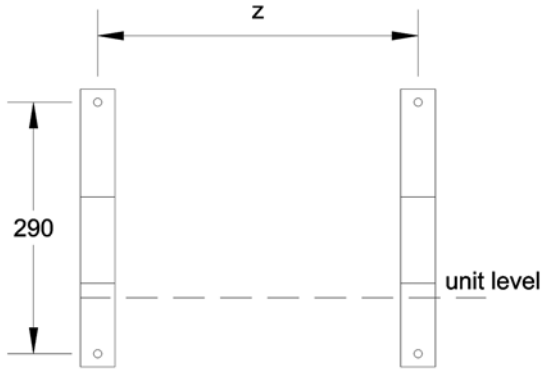
Item N°	Unit Component	Access Details / Fixing
(1)	Motor / Fan	Remove 4-off screw fittings and disconnect electrical connections.
(2)	Electric Section	Remove electric right hand side panel (4).
(3)	Drip Tray	Remove 2-off screws and 4 front screws.

SPECIAL NOTES

DO NOT OBSTRUCT ACCESS PANELS WHEN MOUNTING UNIT

5. LOCATION & MOUNTING OF OUTDOOR UNIT (ICU)





– ICU Wall Bracket Fixing

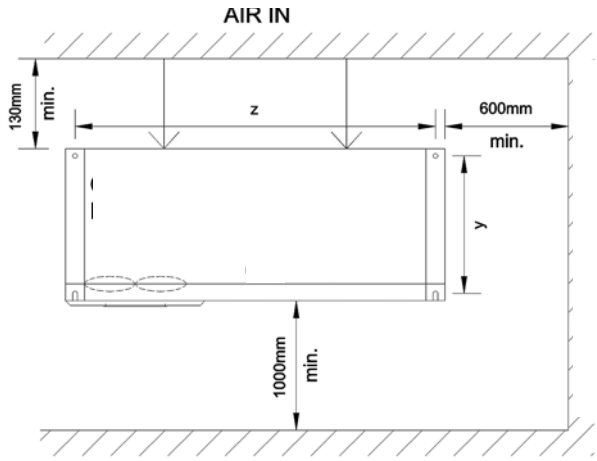


Figure 5.2 – ICU Unit Fixing

Table 5.1 – ICU Wall Mount Kit Fixing

	ICU30	ICU40	ICU55	ICU80
Width mm	720	720	800	800
Height mm	610	610	765	765
Depth mm	250	250	320	320
Weight kg	42	42	60	64
Dim 'y' mm	220	220	290	290
Dim 'Z' mm	670	670	750	750

5.1 Location

The unit can either be mounted on a level surface or suspended from a vertical wall using the Qualitair wall mounting Optional kit (1). The unit should always be mounted on a load bearing wall and not a partition wall. Ensure there is sufficient free area around the unit as detailed in Figure 5.2.

5.2 Fixing

Two-off hole fixings (2) and two-off slot fixings (3) suitable for M10 fixings are provided in the base of the unit to secure the unit to a suitable plinth, or to the wall mount bracket kit. If required, the contractor should install the unit on anti-vibration pads.

5.3 Service Connections

The refrigerant pipe (4) and electrical connections (5) are located at the right hand end of the unit. Ensure there is adequate air entry at the back of the unit as detailed in Figure 5.2 above.

SPECIAL NOTE

ENSURE CONDENSER HAS ADEQUATE CLEARANCE AROUND IT AND IS NOT AFFECTED BY NEIGHBOURING CONDENSING UNITS AND OTHER OBSTRUCTIONS.

6. OUTDOOR UNIT ACCESS (ICU)

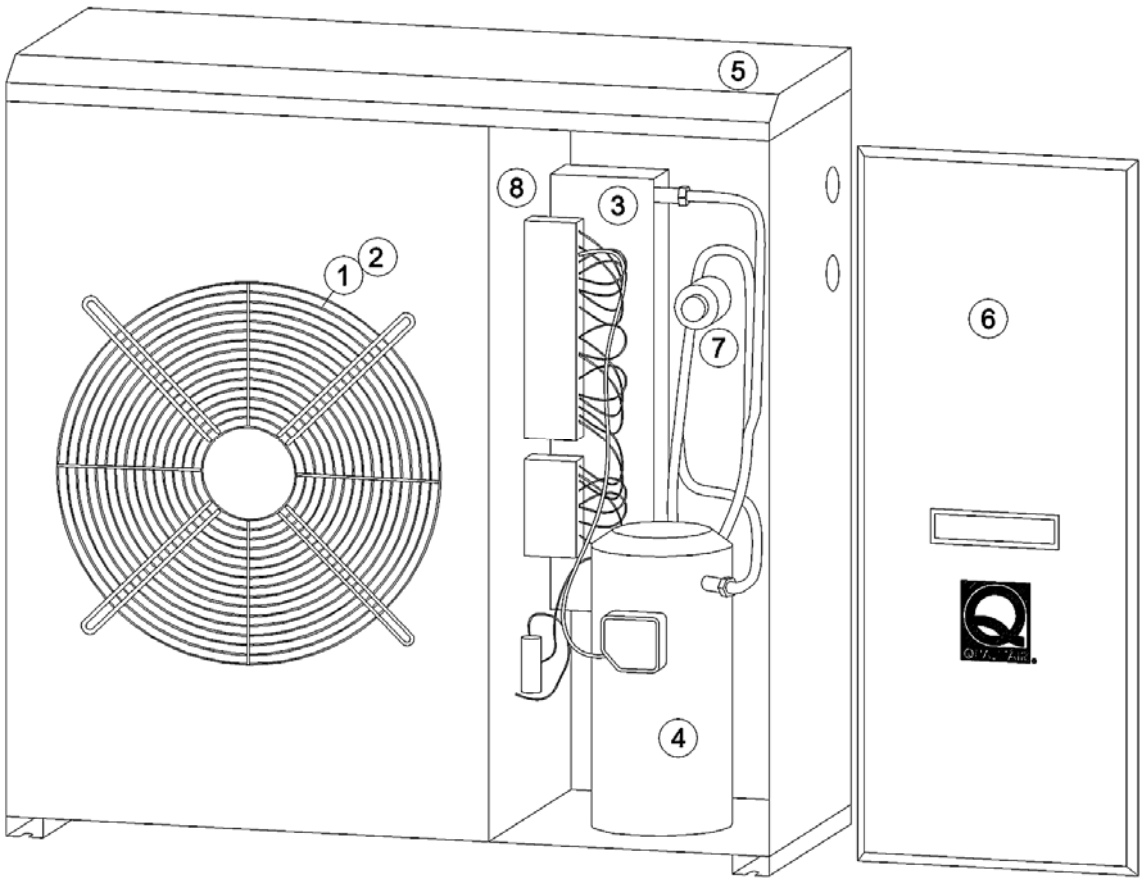


Figure 6.1 – Unit Internal Access

6.1 Access Details/Fixings

Item No.	Unit Component	Access Details/Fixings
(1)	Fan guard	Front access set screw fixings
(2)	Fan/motor ((fixed to rear of fan guard)	Front access set screw fixings on guard
(3)	Condenser coil	Access from rear of unit
(4)	Compressor	Remove “service access panel”
(5)	Removable top panel	Front and side access screw fixings
(6)	Service access panel	Front access screw fixings
(7)	Reversing valve (Heat pump unit only)	Remove “service access panel”
(8)	Electrics/customers connection	Remove “service access panel”
(9)	Unit wiring diagram	Remove “service access panel”

SPECIAL NOTES

UNIT WIRING DIAGRAM IS FIXED TO INSIDE OF FRONT ACCESS PANEL (6),
HP SWITCH IS LOCATED ON THE COMPRESSOR DISCHARGE; LP SWITCH ON THE COMPRESSOR SUCTION CONNECTION.

7. GENERAL SERVICE CONNECTIONS

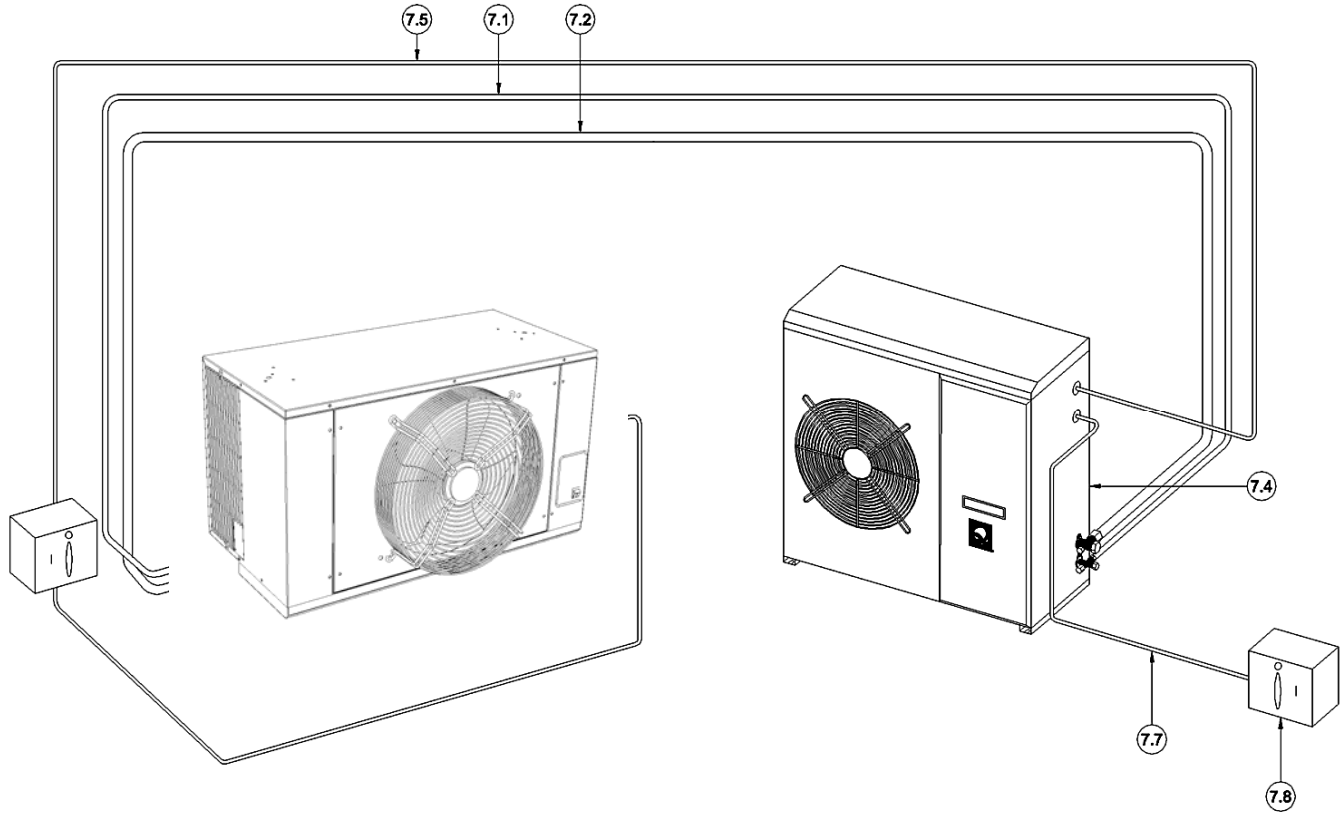


Figure 7.1 – Unit Connections and Interconnections

7.1 – Liquid Connections	See Tables overleaf
7.2 – Suction Connections	
7.4 - Condensing Unit	
7.5 – Interconnecting Cable	
7.7 – Power Cable	
7.8 – Isolator / Fuses	

SPECIAL NOTES

CHECK LOCAL REGULATION FOR INDOOR / OUTDOOR ELECTRICAL ISOLATION REQUIREMENTS AND REFRIGERATION PIPEWORK STANDARDS.

7. GENERAL SERVICE CONNECTIONS CONT

Table 7.3 – ICC Refrigerant Connections

	ICC25	ICC35	ICC50	ICC60	ICC70
Liquid connections	1/4"	1/4"	1/4"	3/8"	3/8"
Suction connections	1/2"	5/8"	5/8"	3/4"	3/4"

Table 7.4 – ICU Refrigerant Connections

	ICU30	ICU40	ICU55	ICU80
Liquid connections	1/4"	1/4"	1/4"	3/8"
Suction connections	5/8"	5/8"	5/8"	3/4"

Table 7.5 – Interconnecting Cable – No. of Cores

	ICC/ICU30	ICC/ICU40	ICC/ICU55	ICC/ICU80
A/C Unit	4	4	4	4
A/C Unit + Heaters	4	4	4	4

Table 7.7 – Mains Power Cable – No. of Cores

	ICC/ICU30	ICC/ICU40	ICC/ICU55	ICC/ICU80
Single Phase System 230/240 V 50 Hz	3	3	3	3
Three Phase System 380/415 50Hz	N/A	N/A	N/A	5

Table 7.8- System Fuse Ratings – HRC

	ICC/ICU30	ICC/ICU40	ICC/ICU55	ICC/ICU80
A/C Unit	10	10	16	20 (10)*
A/C Unit + Heaters	16	16	16	20 (20)*

*Figures in brackets are for three phase condensing units

SPECIAL NOTES :
See Section 11 for interconnecting pipe sizes over 5m.

8. POWER & CONTROL CONNECTIONS

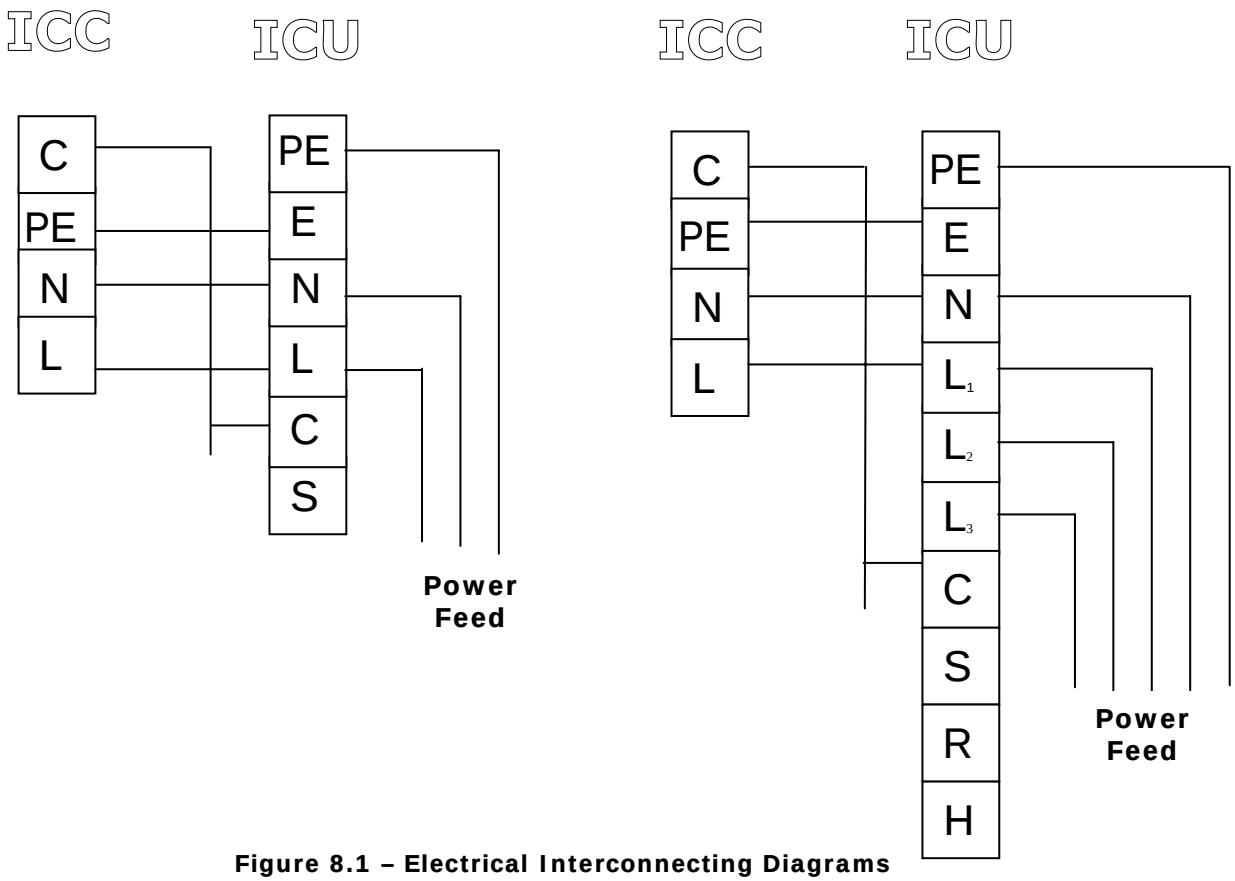


Figure 8.1 – Electrical Interconnecting Diagrams

SPECIAL NOTES:
ENSURE THREE PHASE SUPPLY IS CONNECTED CORRECTLY OR THE THREE PHASE COMPRESSORS WILL RUN BACKWARDS.

8.1 Wiring-up the Unit

Electrical terminations should be made onto the screw terminal side of the indoor and outdoor unit terminal blocks.

8.2 Wiring Requirements

Power supply – Connection of isolation power supply to the outdoor unit.
Interconnecting Wiring – Power and signal cables run between outdoor and indoor unit.
Details of the fuse ratings and cable requirements are given in tables 7.5, 7.6, 7.7, of this manual.

8.3 Terminations

Details of cable terminations and interconnections are given in Figure 8.1.

SPECIAL NOTES:
REFER TO KIT INSTRUCTIONS FOR ELECTRICAL CONNECTION OF SITE OPTION KITS!!
DO NOT MEGGER OR FLASH TEST WITH ELECTRONIC PCB'S IN CIRCUIT!!
INDOOR AND OUTDOOR UNITS SHOULD HAVE LOCAL ELECTRICAL ISOLATORS.

9. DISPOSAL PROCEDURES

NOTE!
All refrigerant, oils and other waste materials must be disposed of in a professional and responsible manner in strict adherence to environmental regulations.

NOTE!
The greatest possible care should be taken at all times to avoid the release of refrigerants to atmosphere.

The de-commissioning, dismantling and disposal of air handling units should be undertaken only by experienced personnel and in full adherence to all safety rules, in particular protection of lungs, eyes and skin from refrigerants, dust, etc. Only approved lifting gear and power tools should be used and access to the work area be restricted to authorised personnel.

- Disconnect the unit from the electrical supply.
- Reclaim all refrigerant from the unit using approved reclaiming equipment according to the manufacturer's instructions. Recovery of refrigerant must be carried out only by operatives registered to refrigerant safe handling.
- Dispose of the reclaimed refrigerant through an approved recycling facility.
- Separate the unit sections and remove to approved recycling facilities.

10. REFRIGERANT PIPE CONNECTIONS

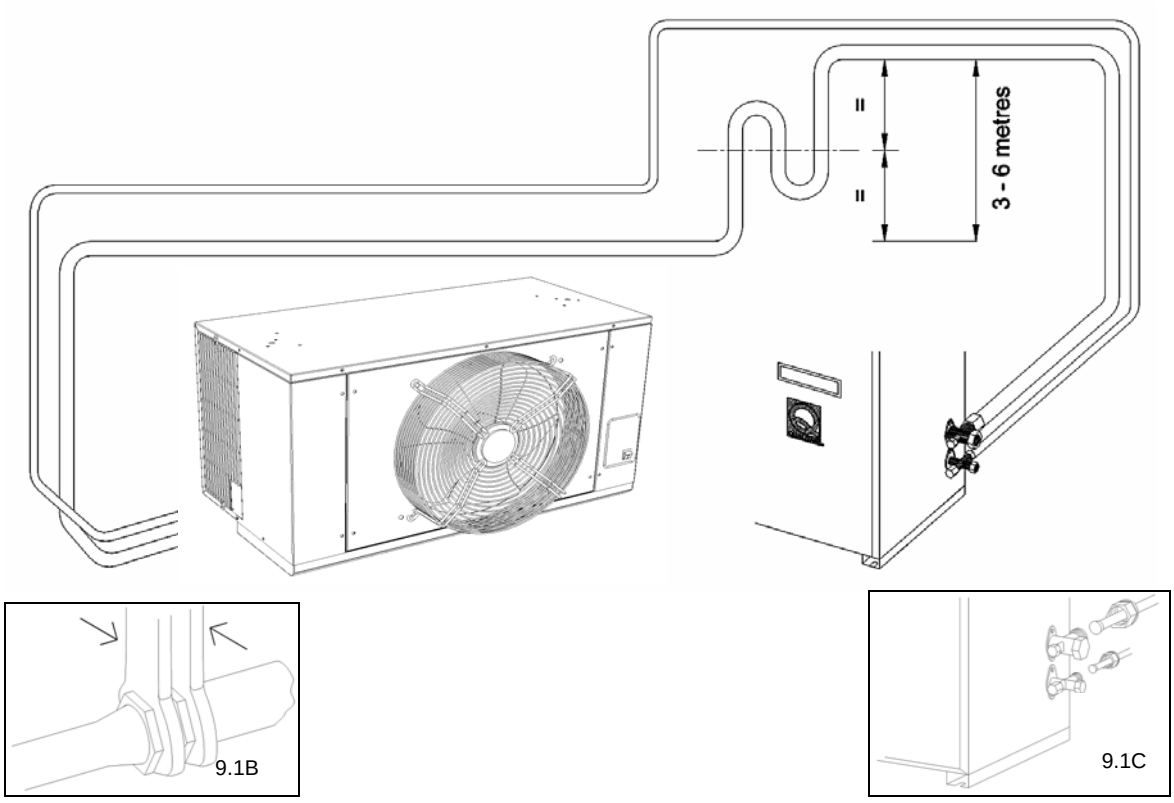


Figure 9.1 – Refrigerant Pipe Connections

10.1 Pipe Installation

Run the suction and liquid lines in appropriately sized refrigeration copper tubing as per the detailed tables in Section 11.2 of this installation manual. When calculating the effective run take into account any bends or oil traps as described in table.
A filter drier should be fitted in the liquid line.
Where the vertical separation exceeds 3 metres, oil traps must be fitted at half the vertical distance as shown on Figure 9.1 above. Ensure the refrigerant lines are adequately supported using refrigerant pipe clips.

10.2 Unit Connections

The outdoor unit connections are terminated in male flare connections as detailed in tables 7.3 and 7.4 of this manual; indoor connections are plain copper tails. Place flare nuts onto the copper tube before preparing the tube with a flaring tool (9.1C). When connecting to the male flares ensure both surfaces are clean and coat the flared surface with refrigerant oil to help ensure a leak-free joint. When tightening the joint use two spanners to prevent twisting of the connections as detailed in figure 9.1B above. Please note that the indoor unit is factory charged with 50psi of dry air or nitrogen which can be safely released to atmosphere.

10.3 Insulation

Suction lines must be insulated to a minimum thickness of 3/8". Hot areas should be avoided when routing liquid lines and consideration should be given to separate insulation of liquid lines, where required, to prevent heat absorption.

SPECIAL NOTE
SLEEVE, SEAL AND WATERPROOF ANY BUILDER WORKS HOLES !

11. REFRIGERATION COMMISSIONING

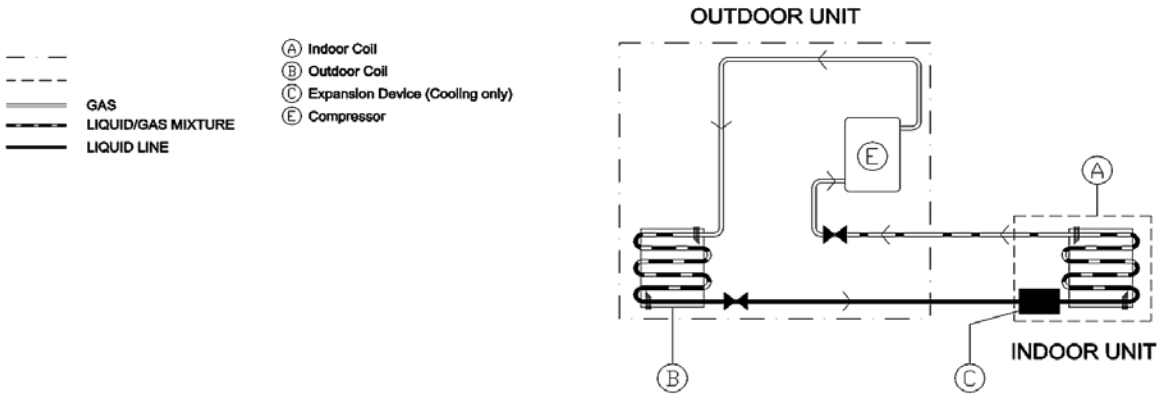
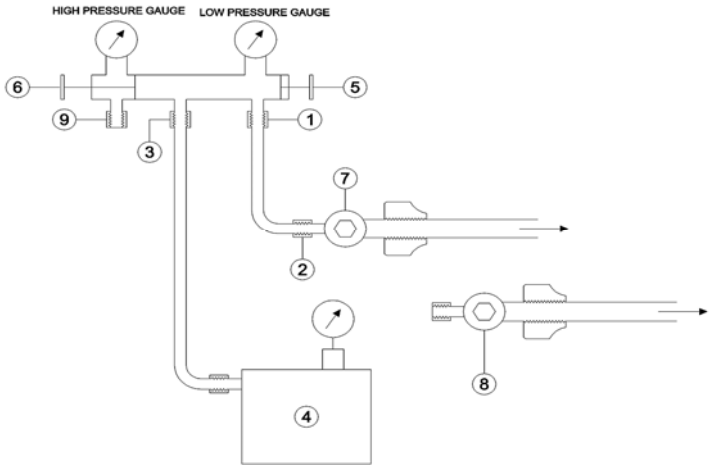


Figure 10.1 – Refrigerant Schematic Diagrams



11.1 Evacuation, Charging and Refrigerant Procedures

After completing the refrigerant connections the following steps should be followed with reference to Figure 11.2 above.

1) Service gauges - Connect the low pressure port (1) of a manifold gauge set to the suction line outdoor unit shut off valve service port (2).
2) Vacuum Pump - Connect the centre line port (3) of the manifold gauge set to the vacuum pump (4) and operate the pump to ensure a vacuum of 200 microns.
   Note: Ensure gauge low pressure port (5) is open and high pressure port (6) is closed.
3) System Isolation - After achieving the specified system vacuum close the gauge low pressure port (5) and switch off the vacuum pump. Leave the system for 1 hour and check that the vacuum is maintained. If not, check for leaks, rectify and repeat the pumping down to 200 microns.
4) Refrigerant Charging - Open both the outside unit shut off valves (7 & 8) to release the factory refrigerant into the system. Weigh in the site top-up charge using a charging station and any additional extended pipe run charge as detailed in Table 10.1 above.
5) Disconnect the vacuum pump and connect the gauge high pressure port (9) to the discharge line of the outdoor unit shut-off valve (10), ensuring that the gauge central port (3) is closed. Run the system, allow pressures to stabilise and ensure correct operation. After final commissioning remove the gauge set, fit all valve caps and carry out a final refrigerant leak test.

System Charge Weights

	ICU30	ICU40	ICU55	ICU80
Base Charge	600g	1100g	1600g	1900g
Site Top-up Charge	0g	0g	50g	100g
Top up charge/m > 5m	25g	25g	40g	40g

11.2 ICU – RECOMMENDED LINE SIZES

Horizontal or Downflow application (Suction Line)

Based on 5psi (0.35bar) Pressure drop

	Table A	Line Length (m) 5	10	15	20	25	30	35	40	45	50	60	70	80	90	100
ICU30	Suction	3/8"	½"	½"	½"	½"	5/8"									¾"
	Liquid	¼"	¼"	¼"	¼"	¼"	¼"	DO NOT USE THIS AREA								
ICU40	Suction	½"	½"	½"	5/8"	5/8"	5/8"					¾"				
	Liquid	¼"	¼"	¼"	¼"	¼"	¼"	DO NOT USE THIS AREA								
ICU55	Suction	½"	5/8"	5/8"	5/8"	5/8"	¾"	¾"	¾"	¾"	¾"	¾"	7/8"	7/8"	7/8"	7/8"
	Liquid	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	½"	½"	½"	½"	½"	½"	½"	½"	½"
ICU80	Suction	5/8"	5/8"	¾"	¾"	¾"	¾"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	11/8"
	Liquid	3/8"	3/8"	3/8"	3/8"	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"

Upflow application (Suction Line)

Table B	Max Size	Max Lift	Additional Oil	R407c – kg Additional Charge
Suction	3/8"	5	None	>5m = 25g/m (¼" Liquid)
Suction	½"	15	None	>5m = 25g/m (¼" Liquid)
Suction	½"	8	None	>5m = 40g/m (3/8" Liquid) >30m = 105g/m (1/2" liquid)
Suction	¾"	30	None	>5m = 40g/m (3/8" Liquid) >30m = 105g/m (1/2" liquid)

Note:

a) = DO NOT USE IN THIS AREA.

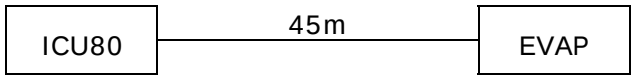
b) Crankcase heaters are required where system charge exceeds 4.5kg and DOES NOT contain an accumulator.

c) Maximum pipe run stated in Table A, must include the reduction allowance (equivalent length) for vertical lifts and fittings indicated in Table B below.

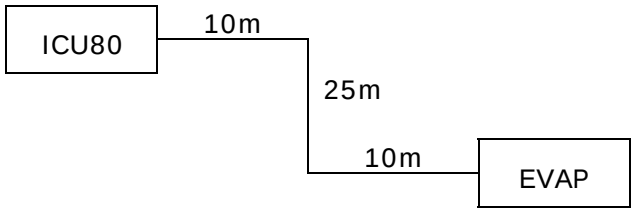
Table C General fitting losses - equivalent straight lengths in metres.

Fitting	Pipe Size 3/8"	½"	5/8"	¾"	7/8"	11/8"
45° Bend	0.12	0.15	0.18	0.21	0.24	0.30
90° Bend Short Radius	0.37	0.43	0.49	0.55	0.61	0.79
90° Bend Long Radius	0.24	0.27	0.30	0.37	0.43	0.52
180° Bend Short Radius	0.73	0.91	1.10	1.28	1.46	1.83
180° Bend Long Radius	0.46	0.55	0.64	0.76	0.85	1.07
90° Elbow	0.67	0.85	1.04	1.25	1.46	1.89
Oil Trap	0.74	0.86	0.98	1.10	1.22	1.58

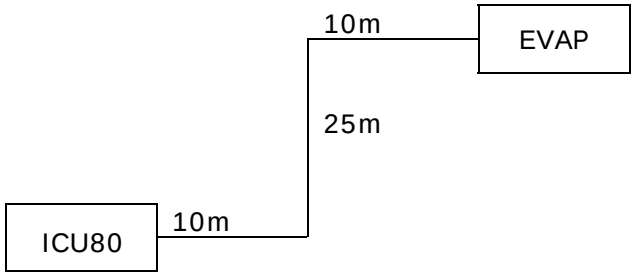
11.3 EXAMPLE OF LINE SIZING



FROM TABLE A	Horizontal Suction to be 7/8” Horizontal Liquid to be ½”
TABLE B	Not applicable
Added Oil	None required
Added Gas	105g x 40m



FROM TABLE A	Horizontal Suction to be 7/8” Horizontal Liquid to be ½”
TABLE B	Vertical Suction 3/4" Vertical Liquid ½”
Added Oil	None required
Added Gas	105g x 40m



FROM TABLE A	Horizontal Suction to be 7/8” Horizontal Liquid to be ½”
TABLE B	Not applicable
Added Oil	None required
Added Gas	105g x 40m

12. ANCILLARY SERVICE CONNECTIONS

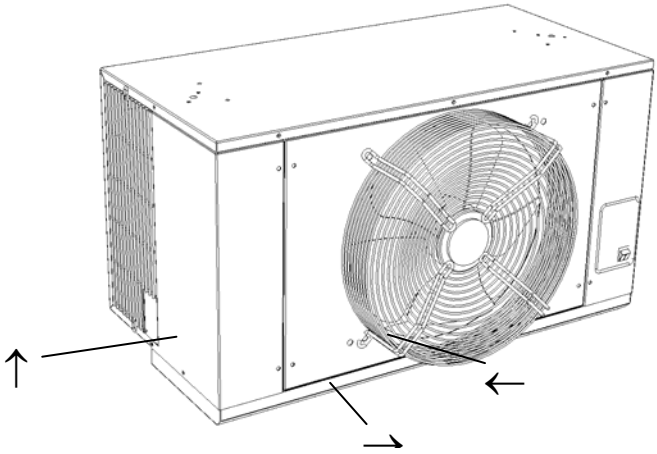


Figure 11.1 – Condensate Services

12.1 Condensate Removal

As standard the condensate is removed by gravity drainage on the bottom of the unit.

12.2 Condensate Connection

A plastic hose connector is supplied loose (to be found inside electrical section) with the unit for site fitting of the condensate tray. In order to fit the connector it is necessary to remove the drain tray (1). The tray is removed by undoing the two-off screw fittings (2) and the four front screw fixings (3). After fitting the connector re-fit the condensate tray.

Note: After installation, pour 2 litres of water into drain tray and check for good drainage.

SPECIAL NOTE

ENSURE ALL CONNECTIONS EXTERNAL TO THE UNIT CASING AND DRAIN PIPEWORK ARE ADEQUATELY INSULATED TO PREVENT FREEZING OR CONDENSATION.

13. FINAL CHECKS

		Check
1)	Have all options kits been fitted ?	
2)	Have units been mounted level and correct drainage been checked by pouring 2 litres of water into drip tray?	
3)	Has the ICU (outdoor) drain been connected, if required?	
4)	Have the suction line and condensate drains been adequately insulated?	
5)	Has the correct HRC external fusing / isolating been installed?	
6)	Has additional extended pipe-run refrigerant charge been measured into the system, where necessary?	
7)	Has the indoor condensate drain been trapped ?	
8)	Is there adequate room and access to remove the access panels ?	
9)	Has the control system been explained to the customer and the operating manual sheet handed over with the appropriate sections completed?	
10)	Has the warranty booklet been read and completed? Note:- If a service contract is not taken out only a 1-year warranty is applicable.	

14 WIRING DIAGRAM NUMBERS

This page gives wiring diagram numbers for each type of indoor (ICC) and outdoor (ICU) unit manufactured by Qualitair. The diagrams themselves are supplied with the unit and are located in the electrical section. Please ensure the correct issue drawing is used with the relevant system; refer to Qualitair, if necessary.

Unit Ref	Function	Type	Phase	Wiring Diagram	Part N°
ICC25, 35, 45/55, 60, 70	Cooling Only	Electromech		A3LBD130	J70632 J70642 J70662 J70682 J70692
ICC25, 35, 45/55, 60, 70	Heat Only	Electromech		A3LBD131	J70631 J70641 J70661 J70681 J70691
ICC25, 35, 45/55, 60, 70	Cooling Only	Electronic		A3LBD132	J70630 J70640 J70660 J70680 J70690
ICC25, 35, 45/55, 60, 70	Heat Only	Electronic		A3LBD133	J70633 J70643 J70663 J70683 J70693

Use the above Wiring Diagrams until ICC Unit Serial N° Q09734. Thereafter, use Wiring Diagrams listed below.

Unit Ref	Function	Type	Phase	Wiring Diagram	Part N°
ICC25, 35, 45/55, 60, 70	Cooling Only	Electromech		A3LBD148	J70632 J70642 J70662 J70682 J70692
ICC25, 35, 45/55, 60, 70	Heat Only	Electromech		A3LBD149	J70631 J70641 J70661 J70681 J70691
ICC25, 35, 45/55, 60, 70	Cooling Only	Electronic		A3LBD150	J70630 J70640 J70660 J70680 J70690
ICC25, 35, 45/55, 60, 70	Heat Only	Electronic		A3LBD151	J70633 J70643 J70663 J70683 J70693
ICU30, 40	Cooling Only	Condensing Unit	1-ph (TS FSC)	A3LBD137	J90733 J90743
ICU55, 80	Cooling Only	Condensing Unit	1-ph (TS FSC)	A3LBD138	J90763 J90783
ICU80	Cooling Only	Condensing Unit	3-ph (TS FSC)	A3LBD139	J90784
ICU100	Cooling Only	Condensing Unit	1-ph (PS FSC)	A3LBD140A	J90723
ICU100, 135, 170	Cooling Only	Condensing Unit	3-ph (PS FSC)	A3LBD141A	J90724 J90714 J90794
ICU30, 40	Cooling Only	Condensing Unit	1-ph (PS FSC)	A3LBD143	J90733 J90743
ICU55, 80, 100	Cooling Only	Condensing Unit	1-ph (PS FSC)	A3LBD144	J90763 J90783 J90723
ICU80, 100, 135, 170	Cooling Only	Condensing Unit	3-ph (PS FSC)	A3LBD145	J90784 J90724 J90714 J90794
ICU80, 100, 135, 170	Heatpump	Condensing Unit	3-ph (PS FSC)	A3LBD146	J90786 J90726 J90716 J90796
ICU40, 55, 80, 100	Heatpump	Condensing Unit	1-ph (PS FSC)	A3LBD147	J90745 J90765 J90785 J90725

CE CERTIFICATE

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ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

89/336/EEC

MACHINERY DIRECTIVE

EC Declaration of Conformity
As Defined by the EC Council Directive on Machinery

89/392/EEC Annex IIA and amended by
91/368/EEC - 93/44/EEC & 93/68/EEC

We declare that the equipment designated below,
on the basis of design and construction in the form marketed by us and
when installed and operated in accordance with our information and instructions,
conforms to the EMC Directive, the PED and the essential Health and Safety requirements of the Machinery Directive.

If alterations are made to this equipment without our approval,
this declaration becomes invalid. Furthermore, this equipment may be
assembled into other systems which may also constitute machinery and shall
not be put into service until the assembled system has been declared in conformity
with the Machinery Directive.

Model	
Serial N°	
Standards Applied	
	BS EN 292-Pt2
EMC	BS EN50081-1
EMC	BS EN50082-1
Low Voltage	EN60204 pt1
Pressure Equipment	prEN14276-2
Controls Applied	BS EN ISO 9001: 1994
	BSI Registered Company Q5026

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Managing Directors

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AN EATON-WILLIAMS COMPANY

As part of the policy of continuous product improvement, we reserve the right to alter specifications without notice